

**BITS, PILANI – K. K. BIRLA GOA CAMPUS**

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2015-2016 Second Semester

Test-1

Course No: ECON F242

Course Title: Microeconomics

Date: 24/02/2016

Maximum Marks: 25

Time: 1 Hour

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**Instructions:**

- 1. If you need to make any assumptions, clearly state them.**
- 2. Please provide concise answers.**

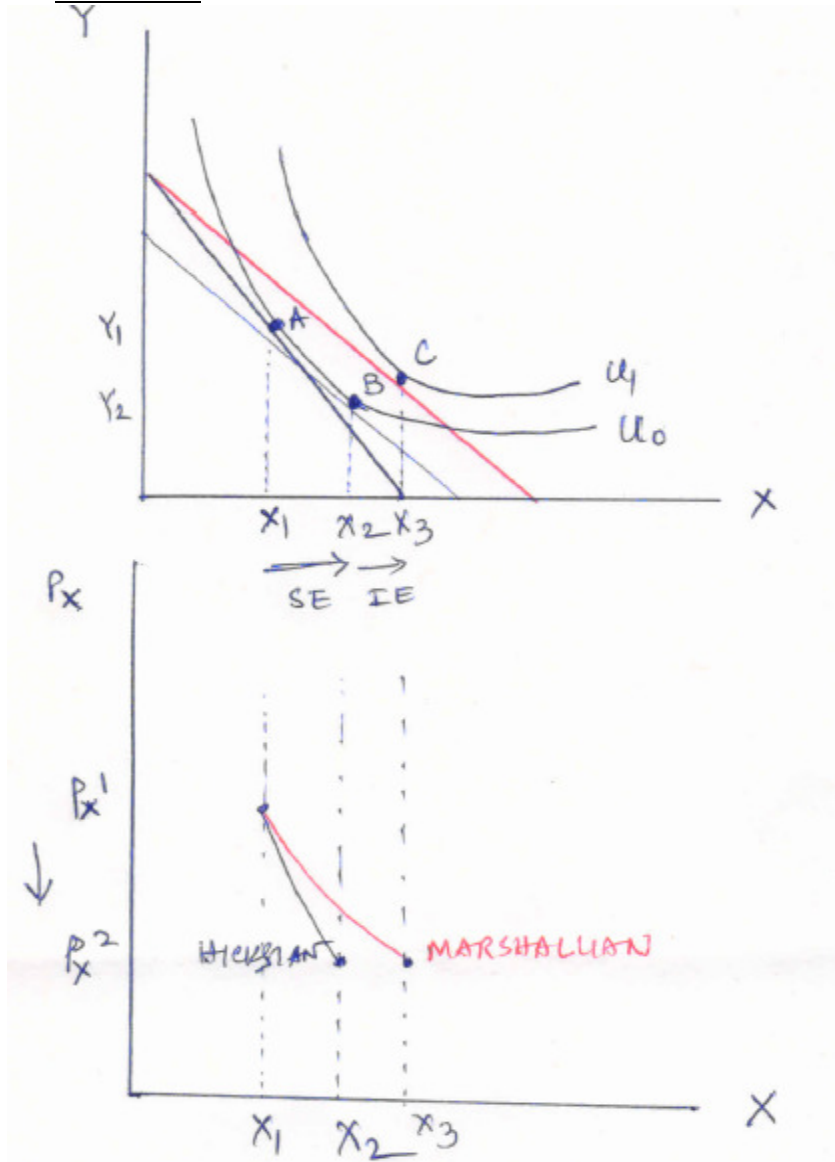
1. Consider a consumer who is considering migrating from State1 to State2. The consumer obtains utility from two normal commodities X and Y. In State1 the consumer is purchasing commodity bundle “A” comprising of quantities  $X = X_1$  &  $Y = Y_1$ . The price of commodity X is lower in State2, hence  $P_X^1 > P_X^2$ . The price of commodity Y is same in both the States, hence  $P_Y^1 = P_Y^2$ .

After migrating to State2, suppose the consumer wants to minimize the expenditure to achieve the same level of utility as obtained in State1. Let that minimizing bundle be “B” comprising of  $X = X_2$  &  $Y = Y_2$ .

Assume that the preference pattern of the consumer can be represented by convex indifference curves and his nominal income remains same.

- a) Use a properly constructed diagram to derive the Hicksian demand curve for X. [2]
- b) How would you derive the Marshallian demand curve for X? Briefly explain the difference between the Hicksian and Marshallian demand curves. [3]
- c) Rank the expenditure(s) associated with bundles A & B. Derive the ranking mathematically. [5]

### Solution 1a



### Solution 1b

Hicksian demand takes into consideration only the Substitution effect of price change. The consumer moves from bundle A to bundle B to minimize expenditure at the State2 prices and achieves the same level of utility  $U_0$  as obtained in State1. This captures the Substitution effect whereby  $X_H$  increases from  $x_1$  to  $x_2$ .

Marshallian demand takes into consideration the Total effect of price change. As price of X decreases in State2, the real income of the consumer increases. Since X is a Normal commodity, the consumer would further increase the consumption of X. This captures the Income effect whereby X increases from  $x_2$  to  $x_3$ . The consumer achieves higher level of utility  $U_1 > U_0$ .

Consequently, the Marshallian demand for X is more elastic /flatter than the Hicksian demand.

### Solution 1c

Expenditure associated with Bundle A > Expenditure associated with Bundle B

$$E(\text{Bundle A @ State 1 price}) = P_X^1 X_1 + P_Y^1 Y_1 > P_X^2 X_1 + P_Y^1 Y_1 \because P_X^1 > P_X^2$$

$$P_X^2 X_1 + P_Y^1 Y_1 > P_X^2 X_2 + P_Y^1 Y_2 = E(\text{Bundle B @ State 2 price})$$

$$\Rightarrow E(A) = P_X^1 X_1 + P_Y^1 Y_1 > P_X^2 X_2 + P_Y^1 Y_2 = E(B)$$

2. The utility function of a consumer from fish and chicken is given by  $U(F,C)=FC$ . In January, 2016 the income of the consumer was Rs 12000 and the prices of both fish and chicken were Rs 100 per kg. In February, 2016 the price of fish increased to Rs 200 per kg and the price of chicken increased to Rs 300 per kg but her income remained same. Two economists are trying to estimate the effect of the price change on the consumer as follows.
- a) Economist1: How much the consumer would have to spend in February if she consumes the same quantities of fish and chicken as she did in January? Compute the numerical value of this expenditure. [4]
  - b) Economist2: What is the minimum expenditure of the consumer in February to get the same level of utility as obtained in January? Compute the numerical value of this expenditure. [4]
  - c) Which Economist would overestimate the expenditure in February? Briefly explain in NOT MORE THAN 50 WORDS. [4]
  - d) Use a properly constructed diagram to support your analysis in part (c). [3]

[Assume that the second order condition for optimization problem is satisfied at the optimal solution].

### Solution 2a

Economist1

$$\text{Max } U = FC \text{ st } 12000 = 100F + 100C \Rightarrow F^* = 60, C^* = 60 \Rightarrow U^* = U_{\text{JANUARY}} = 3600$$

$$200F^* + 300C^* = 30000$$

### Solution 2b

Economist2

$$\text{Min } 200F + 300C \text{ st } U^* = 3600 = FC \Rightarrow F^H = 30\sqrt{6} \approx 73, C^H = 20\sqrt{6} \approx 49$$

$$\Rightarrow E = 200F^H + 300C^H \approx 29393$$

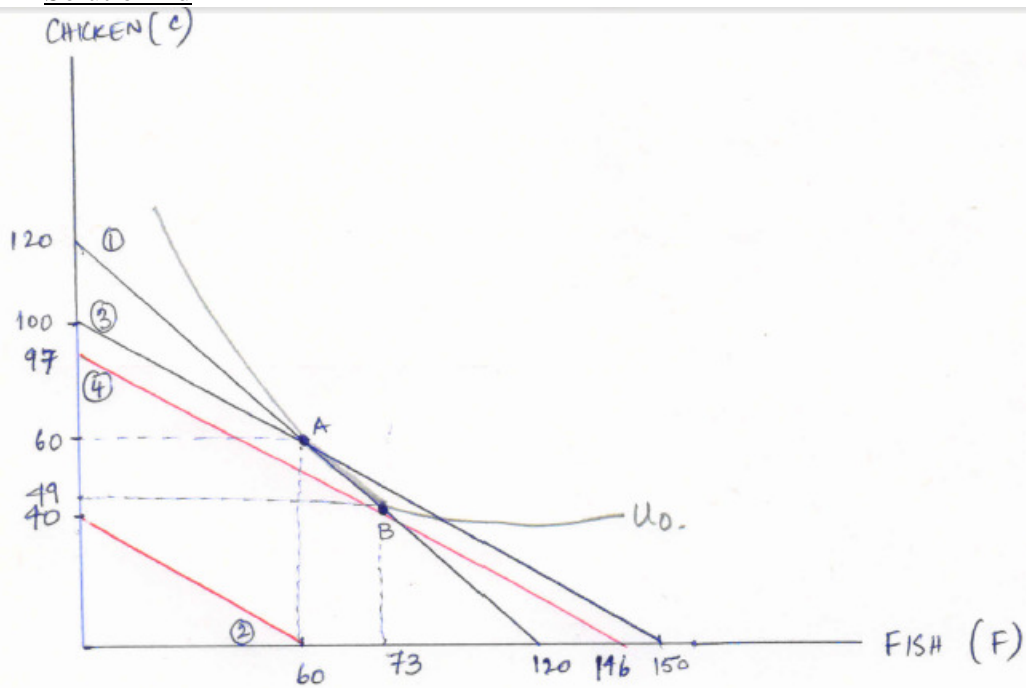
### Solution 2c

Economist1 would overestimate by assuming that the consumer will continue to consume same bundle in February.

Economist2 considers the Substitution effect. As the relative price of fish is reduced (and MRS falls from 1 to 2/3) the consumer would reduce chicken consumption and increase consumption of fish to minimize her expenditure to maintain the same level of utility

$U_{\text{JANUARY}}$ .

## Solution 2d



- ① OLD BUDGET LINE (JAN) :  $12000 = 100F + 100C$   
 ② NEW " " (FEB) :  $12000 = 200F + 300C$   
 ③ EXPENDITURE SUGGESTED BY ECONOMIST 1 :  $30K = 200F + 300C$   
 ④ " " " ECONOMIST 2 :  $29393 = 200F + 300C$